REMARKS

In the Office Action dated January 24, 2006, claims 1-23 are pending. Claims 21-23 stand allowed. Claims 1, 16, and 19 are independent claims from which claims 2-15, 17-18, and 20 depend respectively therefrom. Claims 1, 3, 6, 9-10, 12, 16-17 and 19-20 are herein amended.

The Office Action states that the drawings are objected to under 37 CFR 1.83(a) because: A) they fail to show how the stem 76 is connected to the housing 52, B) what elements of the anode assembly are rotating and what elements are stationary, C) they fail to show reference sign "96" for the holes in the heat shield, D) reference number "100" is shown, but not recited in the specification. A corrected drawing sheet is submitted herewith that provides an amended Figure 3. Figure 3 is amended to clearly show the coupling described in the specification between the bearing encasement 52 and the stem 76. Figure 3 is also amended to replace the reference sign "100" with "96".

With respect to item B above, Figure 3 and paragraphs [0023] and [0031] are amended to clarify which elements of the anode assembly shown are rotating and which elements are stationary. Reference signs "63", "65", and "95" are added to Figure 3 to identify the rotor, can, and backing plate originally shown. The original specification explicitly stated that the anode 56 of the anode assembly 50 rotates and that the anode 56 rotates on the bearing shaft 62. This relationship and the illustrated example shown in the original Figure 3 inferred that the bearing shaft 62 and any item attached thereto rotates and, likewise, infers that the bearing encasement 52 and any item that is attached thereto is stationary. Paragraph [0023] is amended to explicitly clarify that the bearing shaft 62 rotates with the rotor 63. Paragraphs [0023] and [0031] are amended to explicitly clarify that the heat shield 54 is attached to the backing plate 95 and that both are stationary with the bearing encasement 52.

The Office Action states that the specification is objected to for informality reasons. Specifically, the specification is object to for not reciting the shown reference sign "96" and for reciting the not shown reference sign "100". As stated above, the reference sign "100" in Figure 3 is replaced with the reference sign "96". The Office Action also states that the term "glidcup" is not understood. Paragraph [0025] and Table 1 are herein amended to replace the inadvertently misspelled reference term "glidcup" to the registered trademark "Glidcop®", which refers to a copper material having an aluminum oxide dispersant by OMG America.

Claims 9-10, 17, and 20 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The Office Action states that nowhere in the specification does the Applicant provide sufficient guidance for one of ordinary skill in the art to make the determination as to the height of the claimed thermal shield as a function of thermal energy transfer between the anode and the bearings or as a function of the temperature relationship between the bearings. Applicants submit that one skilled in the art, in review of the present application, would now be able to understand and recognize the use of a heat shield as suggested and claimed in the present application, the height parameter of the heat shield, and that relationships exist between the height parameter and the thermal energy transfer between the anode and the bearings. With this understanding and recognition, one skilled in the art, would also understand and recognize that the specific height of the heat shield and the specific relationships between the height parameter and the thermal energy transfer between the anode and the bearings can be determined using known thermal modeling techniques. However, paragraph [0031] is herein amended to explicitly state such determination.

The present application provides a novel configuration, specifically the configuration of the provided anode assembly, and allows one skilled in the art to recognize certain design parameters and relationships associated with

that novel configuration. The specific height of the heat shield depends upon the materials of the elements in the anode assembly, the size and shape of the elements, the exact configuration and coupling of the elements, the number and layout of the holes, if any, in the heat shield, and other related parameters. The specific height of the heat shield also depends upon the desired or permitted heat transfer between the anode and the bearings, the temperature continuity desired between inner and outer bearing races, and the temperature continuity desired between bearings. Performing the calculation to determine the exact values of the parameters for a specific application or determining the specific relationship between the elements is to use know thermal modeling techniques and to merely select design preferences for that application. Thus, Applicants submit that the specification is enabling for one skilled in the art to make the invention.

Also, the Office Action states that claims 9-10, 17, and 20 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite. The Office Action states that the term "radial height" does not make sense. Claims 9-10, 17, and 20, as well as paragraph [0031] are herein amended, as suggested by the Office Action, to delete the term "radial".

The Office Action further states that claims 3 and 5 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite. The Office Action states that claims 3 and 5 contain trademark/trade names. Claims 3 and 5 are herein amended to remove the trademark/trade names.

Thus, claims 3, 5, 9-10, 17, and 20 are now in a condition for allowance at least under 35 U.S.C. 112.

Claims 1-20 stand rejected under 35 U.S.C. 102(b) as being anticipated by Kuzniar (U.S. Pat. No. 6,295,338 B1).

Amended claim 1 recites an anode assembly that includes a thermally conductive bearing encasement, which covers a portion of a bearing. An anode rotates on the bearing and has a target with an associated focal spot.

The focal spot is displacement sensitive in response to the expansion of the bearing encasement. The bearing encasement is configured and expansion limited to prevent displacement of the focal spot of greater than a predetermined displacement.

Kuzniar discloses an x-ray tube that includes an envelope 26 that has a tubular wall section 100 with a race mount 102 and an end cap 104. The race mount 102 and the end cap 104 are an integral part of the wall section 100. Within the wall section 100 is outer race member 66 and inner race member 62, which hold bearings 64 and 65. A stem 32 extends within the inner race 62 and out to an annular disk or anode 30.

The Office Action refers to the wall section 100 of Kuzniar as a bearing encasement and states that the bearing encasement is expansion limited and prevents displacement of the focal spot. The office Action refers to col. 9, line 55 through col. 10, line 3 of Kuzniar for such reliance. In the stated section, Kuzniar discloses that the race member mount 102 and the end cap 104 are comprised of metal, such as Kovar. The Kovar material is used as a transition material to join the portions of the envelope 26. It is stated that the Kovar material is easier to machine, that it provides an electrical path, and that it is thermally conductive efficient. Nowhere in the stated section or anywhere else in the Kuzniar reference does it state that the envelope 26 is expansion limited. The disclosure of Kuzniar may only suggest that a small portion of the envelope 26 is expansion limited due to the stated use of Kovar. However, the remaining portions of the envelope 26 do not appear to be expansion limited and thus the envelope as a whole is not expansion limited.

Also, regardless of whether a small section of the envelope 76 is formed of Kovar, it is not clear that the focal spot or target of the anode 30 of Kuzniar is sensitive to displacement of the envelope 26. Nowhere in Kuzniar is it stated nor is it clear that the anode 30 displaces due to the expansion of the envelope 26. In fact it appears that the anode 30 may not be displacement affected by the expansion of the envelope 26, since the envelope 26 is external

to the anode 30. Also, other aspects of the configuration of the x-ray tube assembly of Kuzniar appear not to be conducive to such displacement. For example, the race members 62 and 66 and the bearings 64 and 65 are held in place with respect to the envelope 26 via a locking spring 72. It appears as the bearings 64 and 65 heat up that there is increased pressure in a longitudinal direction on the bearings. It does not appear that as a result of the bearings 64 and 65 heating up that the anode 30 or any part thereof moves. It is also not clear whether the bearings 64 and 65 heat up to such an extent to expand or to noticeably expand.

The Kuzniar reference fails to recognize the problem solved by the claimed invention, specifically the expansion of the bearings and the bearing encasement, which can cause undesired focal spot displacement. As similarly stated, it is not clear whether the x-ray tube of Kuzniar, with or without the heat shield 216, would exhibit focal spot displacement due to the heating or expansion of the envelope 26. As such, the x-ray tube of Kuzniar fails to solve the stated problem.

Thus, Kuzniar fails to teach or suggest the limitations of an anode having a focal spot that is displacement sensitive to expansion of a bearing encasement and a bearing encasement that is expansion limited. Also, since the stated limitations are not taught or suggested, clearly the limitation of preventing displacement of a focal spot to no greater than a predetermined displacement is also not taught or suggested. In order for a reference to anticipate a claim the reference must teach or suggest each and every element of that claim, see MPEP 2131 and *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628. Thus, since Kuzniar fails to teach or suggest each and every element of claim 1, claim 1 is novel, nonobvious, and is in a condition for allowance. Also, since claims 2-15 depend upon claim 1, they are also novel, nonobvious, and are in a condition for allowance for at least the same reasons.

Claims 16 and 19 have similar limitations and are thus described herein together. Claim 16 recites an x-ray source that has an anode, which rotates on

and around a bearing. The anode has a target whereupon the electrons impinge to generate x-rays with an associated focal spot. A thermal shield resides axially between a thermally conductive bearing encasement and the anode along an axis of rotation. Claim 19 recites an imaging system with an x-ray source that has an anode that rotates on and covers a bearing. The thermal shield of claim 19 resides and extends longitudinally between a thermally conductive bearing encasement and the anode along an axis of rotation.

The claimed x-ray sources are clearly different than the anode assembly 24 of Kuzniar. Although the anode 30 of Kuzniar rotates on the stem 32, the anode 30 does not rotate around or cover the bearings 64 and 65 or any other bearings for that matter. The anode 30 is separated from the bearings 64 and 65 by the stem 32. The bearings 64 and 65 are down the stem 32 from the anode 30 and are not located within the anode 30. The anode 30 rotates within the first envelope portion 74, as opposed to the bearings 64 and 65, which rotate within the second envelope portion 76.

In addition, the heat shield 216 of Kuzniar is different than the thermal shields claimed. The heat shield 216 is conically shaped and, along the axis of rotation, is disposed between the stem 32 and the envelope 26. The heat shield is not disposed between a bearing encasement and an anode, as claimed.

Also, due to the different configuration of the x-ray tube of Kuzniar, the thermal relationships between the anode, the heat shield, and the envelope are not the same as that of the anode, the thermal shield, and the bearing encasement claimed. Note the heat shield 216 of Kuzniar does not prevent or limit the transfer of thermal energy from the anode 30 to the envelope 26 rather it prevents thermal energy transfer between the anode 30 and the bearings 64 and 65. Thermal energy may be transferred directly between the anode 30 and the envelope 26 through the vacuum area between

the anode 30 and the envelope 26. Notice that, for the most part, there is nothing between the anode 30 and the envelope portion 74.

Thus, Kuzniar also fails to teach or suggest each and every element of claims 16 and 19. Therefore, claims 16 and 19 are novel, nonobvious, and are in a condition for allowance. Also, since claims 17-18 and 20 depend from claim 16 and 19, respectively, they too are novel, nonobvious, and are in a condition for allowance.

With respect to claim 12, the Office Action states that the heat shield 216 of Kuzniar has a hole 221. Applicants submit that the hole is not radially oriented, as the hole(s) claimed. Thus, the thermal shield claimed is different than the heat shield 216. Therefore, claim 12 is further novel and nonobvious for the above-stated reasons.

In light of the amendments and remarks, Applicants submit that all of the objections and rejections are now overcome. The Applicants have added no new matter to the application by these amendments. The application is now in condition for allowance and expeditious notice thereof is earnestly solicited. Should the Examiner have any questions or comments, he is respectfully requested to contact the undersigned attorney.

Respectfully submitted,

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